FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

Vol. 75 Thursday, March 1, 1945 No. 1489

The Foreman's Job

A cursory glance at an article, "Analysing the Foreman's Job," which appeared in a recent issue of the "Iron Age," gave us the impression that some new sort of efficiency expert was checking up on this overworked official to see whether he was carrying out all the duties which he has assigned to him. It occurred to us that only too often nowadays the foreman has to do all the jobs not undertaken by the numerous technicians and officials found on the staff of any large modern industrial concern. On reading the letterpress, however, we were pleased to see that emphasis is rightly placed on the notion that the only sane way to organise a large plant is to ensure that each member, including the foreman, has only one "boss." This article was based on and illustrated by a fairly lengthy *questionnaire*. It was divided into two main sections and sought information under a dozen headings.

The first section, "Authority," asks: (1) Who gives you your orders and instructions. (2) How do you receive your orders (*a*) verbally, or (*b*) in writing? (3) Do any other persons or departments give you orders and instructions? Name specific departments and persons. (4) What kind of orders and instructions do you get from each of the above? (5) How often? On the receipt of a batch of such filled-in forms, the managing director would probably learn many things of which previously he had no knowledge! It would no doubt whip up his interest in the second section, "Job Details." In this the following information is required: (1) What are your daily, weekly, and monthly and miscellaneous duties? These have to be listed completely, and the percentage time spent on each duty detailed. (2) Write out the names and jobs of the people who work directly under you, giving their job duties. (3) What standards do you use to check (*a*) quality; (*b*) quantity, and (*c*) employee efficiency. (4) Give a brief description of the physical working conditions in your department, such as long hours, heat, noise, vibration, etc. (5) What technical qualifications are necessary to run your department? (6) What educational background is needed? And finally (7), what other qualities do you think important.

With the exceptions of questions (1) and (2), which without sacrificing logic could be transferred to section 1, "Authority," the balance being philosophical, could best be transferred to the Brains Trust. Of course, for (*a*) and (*b*) of question 3, one could write "B.S.S." and "tons" respectively, but we fear that this is not what is sought. As for No. 4, surely the next inept of the "high ups" should have a general knowledge of the working conditions in each department without leaving it to the foreman to tell them. As for the last question, one could not blame any whimsical foreman for inserting "ability to fill in philosophical *questionnaires.*"

Our adverse criticism of the latter part of the form may be due to a lack of appreciation of American conditions, but the use of this first part by a newly appointed managing director would be preferable to the usual method of cross-examining a few individuals in whom he thinks he can repose confidence. An analysis of many such investigations would reveal, we believe, a condition of affairs which called for more help with his multitudinous duties and less interference from the ever increasing number of specialised, yet extra-departmental technicians and officials. If our post-war industry is to be operated efficiently, the foreman must have delegated to him absolute control over his own department, subject only to veto by one man—his manager.

MR. ROBERT DOXFORD, of Boarshead, Sussex, who was at one time connected with the Sunderland shipbuilders, William Doxford & Sons, Limited, has died.

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CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

YOUTH IN THE FOUNDRY

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—I read with increasing interest your editorial in the late issue of your Journal regarding the "Appeal to Youth."

It was a pleasant assurance that there is a strong body of opinion in the trade which is making practical contribution to a solution of the problem of juvenile recruitment into an industry whose skilled labour strength is fast declining. However, in my opinion the suggested formula evolved by the Manchester and District Ironfounders' Association does not go deep enough. To get the young apprentice through the foundry doors is a comparatively easy task; it is not quite so easy to keep him. A few of the bigger and more enterprising firms have formulated their own schemes for the training and development of youth in foundry technique and practice. But what of the numerous small and medium sized foundries which form a substantial part of the industrial organisation, a part where some of the best training in ironfounding is available? In such places, either for financial reasons or lack of interest in the problem, no effort is made to develop to the fullest possible extent the young material which is at hand. Unless consideration is given and provision made in these cases there is a real danger that vital support will be missing and the formulated plans seriously in danger of failure.

I cannot agree with your contention that glamorisation would be any real value in "selling the trade." It would be putting the industry on a psychologically unsound basis. Surely the undoubted problems and the intrinsic value of the trade is attraction enough, especially if the challenge aspect is sufficiently stressed.

These observations lead me to conclude that some liaison between the industry and school is a vital necessity if the scheme is to be fully developed. Space will not permit me to develop this thesis, so I will conclude on an expectant note.

Yours, etc.,

D. J. THAWLIS.

135, Talbot Road, Newton, Hyde, Cheshire
February 22, 1945.

[In fairness to ourselves we should point out that we did write in connection with glamour, "perhaps it is just as well to tell an honest story of diverse interest."—EDITOR.]

PUBLICATION RECEIVED

Hints to Businessmen Visiting New Zealand. Issued by the Department of Overseas Trade, Hawkins House, Dolphin Square, Grosvenor Road, London, S.W.1.

This booklet is set out on lines similar to those issued before the war, and gives the essential information required by businessmen visiting this Dominion. Others are in course of preparation, and as a harbinger of peace we look forward to their receipt.

FORTHCOMING EVENTS

MARCH 7.

Institution of Chemical Engineers:—Joint area meeting with the South Yorkshire Section of the Royal Institute of Chemistry. Visit to Nitrogen Fertilisers, Limited, Flixborough, in morning. Luncheon at the Blue Bell Hotel, Scunthorpe. "The Future Aspects of Research for Industry," by Dr. E. W. Smith, President of the Institute of Fuel.

MARCH 8.

Institute of Metals (London Local Section):—Discussion on "Metals in Housing," to be opened by G. H. Friese-Greene. At 4, Grosvenor Gardens, London, S.W.1.

MARCH 9.

Manchester Association of Engineers:—"The Trend of Modern Steam Locomotive Design," by H. J. Hulme. At the Engineers' Club, Albert Square, Manchester, at 6.30 p.m.

Institution of Mechanical Engineers:—Conference on Surface Finish. At Storey's Gate, St. James's Park, London, S.W.1, at 10.30 a.m. and 2.30 p.m.

MARCH 10.

Keighley Association of Engineers:—Annual dinner, at 5.30 p.m., at which the guest of honour will be Sir Miles Thomas, D.F.C., vice-chairman of the Nuffield organisation.

Institute of British Foundrymen

MARCH 3.

Bristol and West of England Branch:—"Plaster and Plastic Patternmaking and Low Melting Point Metals," by H. Plucknett. At the Imperial Hotel, Exeter, at 3 p.m.

INSTITUTE OF VITREOUS ENAMELLERS

A quarterly meeting is to be held on March 23 and 24, at Stoke-on-Trent. The headquarters will be at the North Stafford Hotel. The following programme has been arranged:—

March 23.—4 p.m., Council meeting; 6.30 p.m., dinner; and 8 p.m., technical meeting, at which the following Papers are to be presented:—(*a*) "Grinding," by Mr. Bernard Moore, ceramic consultant, and (*b*) "The Pottery Industry in North Staffordshire," by Mr. Arthur E. Hewitt, managing director, W. T. Copeland & Sons, Limited, manufacturers of "Spode."

March 24.—9.45 a.m., leave hotel for Stoke-on-Trent; 10 a.m., meet at the factory of W. T. Copeland & Sons, Limited, Stoke-on-Trent, for conducted tour of works; 1 p.m., luncheon; 2.15 p.m., Paper by Mr. S. Hallsworth, "Comparisons of Opacifiers Used in the Vitreous Enamelling Industry on Sheet and Cast Iron"; and 3.30 p.m., tea.

INDEX TO VOL. LXXIV

The index to Vol. LXXIV (September-December, 1944) is now ready, and may be obtained on application to the Publisher, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe, Bucks.

WHAT THE ENGINEER EXPECTS FROM THE FOUNDRY*

By W. P. EASTWOOD

Developing a close liaison between drawing office and foundry.

One of the biggest handicaps that many foundries labour under is the lack of interest shown in the foundry by the principals of firms. Like coal mines, they are looked upon as a dirty but necessary evil, and there has not been shown in the past sufficient interest in the equipment and conditions of many foundries, and there has been a complete lack of realisation of foundry difficulties by the engineering side of composite businesses. Similarly, many drawing office and design staffs have little or no knowledge of foundry practice and therefore, failing this knowledge, it should be a first essential that there should be a close liaison and consultation between drawing office and foundry, and thereafter between the foundry and engineering shop, before work is put through the patternshop.

The immediate and obvious answer to the question is, of course, sound castings true to drawing and pattern, free from blowholes, porosity, of the requisite hardness and yet conveniently machinable, nicely fettled and perfect in all respects.

One may ask, however, "What is an engineer?" There is, for example, the motor engineer, whose requirements would probably emphasise the need for a sound, close-grained iron readily machinable, with castings definitely repetitive because of his fixtures for machining purposes, and whose demands necessitate very accurate coring of water passages and conditions as to cylinder wear; or he might be a domestic heating engineer requiring sectional boilers and radiators subject to wide variations in temperature and, maybe, with a small degree of steam pressure which entails the use of thin-shelled vessels where non-porosity is perhaps the first essential; or a general engineer requiring a high-tensile casting where machinability is of minor importance; or a machine-tool maker whose requirements are probably as difficult to satisfy as anybody, requiring as he does a casting free from distortion, of good strength, and yet of high-tensile and machinable qualities on slideways and faces.

Personal knowledge is limited primarily to machine tools, and in trying to answer the title question of this Paper it is necessary initially to split the job into heavy castings and light or repetition castings. The firms with which the Author is connected make primarily lathes and planing machines, whose bed castings may weigh up to a maximum of 20 tons.

Nowhere in the world is there to be found a district so competent and capable as the West Riding in this class of work, as no amount of theory can entirely take the place of the knowledge and technique which has been acquired by years and even generations in heavy floor moulding. Referring again to personal experience, limited to lathe and planer beds up to 40 ft. long, the chief requirement is that in the finished machine these shall be sound and straight to within thousandths of an inch, with slide ways dense and wear resisting of an order of 200 to 220 Brinell hardness.

The different technique of two foundries producing these castings for his firm can be shown by the fact that one foundry moulds them in greensand in the floor, with slab cores down the sides and on the bottom of the mould to form the bed flats, the body being cored out and the body cores resting on plates on the bed cores. The other foundry dispensed with the slab cores, but used facing sand and dried the mould with hot air injection. About 1½-in. camber vertically and 1 in. sideways was an average allowance, and, generally speaking, they were fortunate enough to get castings up to 30 ft. long to within ¼ in. of being straight. This was a most important consideration, because, if they were to have good density on slideways, there must be a minimum of machining to avoid getting into the softer metal.

Disadvantages of Chilling

In the casting of certain beds, however, where there is a large bulk of metal immediately behind the slideways, there is still the danger of the hot fluid mass drawing from the flats, which, of coufse, would be fatal, and here they were still having to resort to the use of chills, which are about 9 in. long, ½ in. thick, with ¼ in. clearance between them, but which do serve to densen the metal on the outer skin, and providing the castings are reasonably straight, give satisfactory results, although if a casting should come ¼ in. out of straight, the effectiveness is lost, as the chilling is seldom effective more than about $\frac{3}{16}$ in. A further disadvantage of chilling is that in addition to the surface density induced in the casting, there is a big release of stress when machined, so that a casting can warp very considerably when the highly stressed chilled skin is removed. A far better method is to improve the mix itself and get a better structure right through the casting, although wartime conditions have made it not always possible to get the appropriate ingredients.

A third method, and one of which the Author has but little personal knowledge as yet, but is now acquiring, is that of flame hardening. This process consists of first machining the casting and then subjecting the slideways to fairly intense local heat from a number of oxy-acetylene jets travelling over the machined faces and closely followed, say, ½ in. behind, by a number of water or suds jets, which immediately quench the surface which has just been heated. This process gives a surface Brinell of anything up to 450 to a depth of

* A paper read before the West Riding of Yorkshire Branch of the Institute of British Foundrymen, Mr. J. Blakiston presiding. The author is on the staff of George Swift & Sons, Ltd., and President of Halifax Section of the Institution of Production Engineers.

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up to ¼ in., according to the rate of travel and technique evolved. The difficulties with this process, however, are that there is bound to be some casting distortion and the face of the casting is so hard that grinding is usually essential.

From the foundry side an entirely different technique as to mixture, particularly with regard to the carbon content, graphitic carbon having to be to a large extent eliminated and the combined carbon controlled.

Requirements for Small Castings

These castings include gearboxes, bodies of small tool and similar components. Here, for anyone to be competitive in the post-war period, it would be essential for them to visualise quantity, or at any rate batch production of machines, if the engineering shop is to perform its repetition machining at a price, and it is essential that it should receive repetition castings. This, of course, has been achieved in those industries such as the motor-car industry, where quantity and repetition production are established, but has not always received consideration in the past by those engineers whose batches may be 12, 25 or 50 off and who, having once produced a wooden pattern, think they can forget about this, and the necessary castings will be produced by the foundry *ad infinitum* in whatever quantity may be demanded.

The principle adopted in any good machine-tool works is such that the fettled casting as received from the foundry will go straight into some form of fixture for an initial machining operation to fix a datum from which all subsequent operations will be located. This may take the form of lugs cast on for this purpose only or one face-machined and a dowel hole put in as a location for all subsequent checks. Take, for instance, the casting of the body of a vertical milling machine which stands on the floor, has vertical slideway faces for the reception of the milling head, horizontal slideway faces for the reception of the compound tables, side facings for the feedbox, and a variety of other facings for the motor drive elevating gear, the body itself being of curved form and awkward to hold on a machine. Here one would suggest that temporary lugs would be cast on and that upon receipt in the engineering shop it should be dropped into some form of cradle locating from the faces which are subsequently to be machined, and then an initial machining operation would take place from which all subsequent operations and jigs would be located.

This, however, throws the responsibility back on the foundry for producing similar castings time after time, otherwise considerable labour would be lost in marking them out and throwing them this way and that to try and bring all the different faces into line for machining.

Requirements for the Smallest Castings

Coming to still smaller castings, such as gearboxes, with intricate cores and comparatively thin metal, there is scope for much ingenuity. Here the personal class of work does not readily lend itself, as the quantities are not sufficiently large, but examination of some American machine tools has shown that they have a control over repetition castings of this type which is rarely seen in this country except in the motor-car and the like. Whether it is that the quantities over there warrant the production of much more elaborate patterns and coreboxes, it is difficult to state, but some of the gearboxes examined have had an absolute minimum of machining to come off boxes and facings, and permit a tighter assembly than comparable ones in this country. It may be that the quantities warrant them baking their cores in metal formers and that they utilise jig assembly of the cores in the moulds. They certainly spend infinitely more pains on fettling and sand blasting than is the average practice in this country.

Thin-sectioned Castings

Lastly, there is the very light type of casting, such as guards, covers, etc., which is a specialist's job, as is the casting of radiators, sectional boilers, etc.; and perhaps no foundry engaged on heavy and general work can ever undertake this class of work satisfactorily unless it has a separate cupola giving a different and more fluid iron from that used on the general casting side. In the Author's particular case, he obtains many of his light castings from Scotland, where this type of work seems to have developed to a greater degree than in the West Yorkshire district, although he does obtain a satisfactory supply locally where the thickness is $\frac{3}{16}$ in. to ¼ in. or more. In either case, however, the primary requirements are for repetition of shape and close limits and tolerances, with as little machining as possible.

Delivery Requirements

Another point in connection with small castings which is of vital interest in the engineering works engaged on quantity production, is that of delivery in batches. This is one of the difficulties that the firm not controlling its own foundry is always up against. The Production and Progress Office may budget for a batch of 25 or 50 machines; and the appropriate cards be issued, and the steel components which can be drawn from stores may flow through the various machining operations satisfactorily, but it is equally important that the appropriate castings should come through to time as well, and it is more important generally that these castings should be available because of the time lost in changing over fixtures: holding equipment and getting from and returning to stores, the appropriate tooling equipment. The office work in so many foundries, particularly jobbing foundries, is most deficient. How many foundries does one see locally where the partners either work in the foundry themselves or at any rate leave the office in charge of a clerk or girl, and who have absolutely no check apart from a mental one on the position of orders, particularly for small castings, and also a greater or lesser degree on checking in and checking out customers' patterns and coreboxes, which are all too often thrown in a corner when finished with, and

when next required have some facing or coreboxes missing?

Whilst on the subject of deficiencies in the smaller type of jobbing foundries, there is that of scientific control. Admittedly the work that some of them do is satisfactory, but it is generally due to years of knowing how, and whilst it may have sufficed in the past, it is certainly not going to suffice in the future. Once when ringing up a local foundry to ask for the specification of their mix against a particular tender, the information received was:—One barrow of coke, two forks of scrap, and so much pig. Nearer than that one could not get, although, strangely enough, the castings produced by this foundry easily fulfilled the requirements of the Department's specification.

The bigger foundries have their own laboratories and scientific control, but facilities are available also for the smaller firms through various consultations and the Institute if they care to take advantage of them, but there is a lethargy on the part of many foundries to do so. There is also the question of costs—whether it may be better to charge per unit as against per cwt.?

Fabricated Structures

Diverting for a moment from the question of castings, one might ask to what extent fabrication is going to oust the casting? Personal opinion is that it never will, although for some structures it has been used with considerable success. This was most noticeable on some of the American machine tools imported during the war, which at first sight appeared to be beautiful castings, but which on closer examination proved to be steel welded but with very nice beadings and fillets incorporated, to give the appearance of a very well finished casting. A Manchester concern has, for instance, developed a very fine technique in building up the stators for its large generators where the pattern cost in view of the limited number off would be very high, but when the possibility of some welded bedplates was discussed, they expressed the opinion that it would be necessary to anneal the complete fabrication to relieve the strains set up during welding, however carefully the structure may be tacked in the first instance.

One big advantage the fabrication has over the casting is that it is possible to incorporate different qualities of material in different sections, as for instance in the slideways of a machine tool, which could be of a very hard steel, whilst the body itself may be of ordinary mild steel, and furthermore weight can be cut down where in a casting it would be necessary to have a fairly heavy wall thickness to avoid drawing from large bulk of metal, whereas in a welding a thin wall might suffice.

Conversely, however, to the substitution of fabrication for castings, there is the possibility of substitution of alloy type iron castings for forgings. Very few engineers are yet really appreciative of what the foundry can furnish in this connection. In machine tools, for instance, spindles and heavy gear wheels, which have hitherto always been automatically made from steel forgings, builders can often satisfactorily employ alloy iron for these purposes. The Author's concern had an experience in this connection in the early part of the war, when certain heavy forgings were in short supply, and he could not obtain them for the heavy wheels and table racks of planing machines. He was therefore compelled to try alloy iron for these components, admittedly with some misgivings. So far his firm has not experienced a single failure, as the substitute material has taken the full load the designs are planned to withstand, and, what is more, a better surface finish is apparent after running than was the case when running steel on steel. At the moment the works are still using alloy iron castings for these purposes, but are now flame hardening the teeth so that it is getting a surface hardness far in excess of the steel forging components originally used, and so far as can be seen, a completely satisfactory core strength, although it is obvious the tensile strength is not as high as was the case with the forged steel.

Steel Castings

In this field personal experiences have been most unhappy. There are two or three foundries which are reputed to be able to, and in fact do, supply very good clean and machineable steel castings, but the Author has had supplies from several foundries which are nothing but a disgrace. The components in question are primarily faceplates for lathes up to 6 ft. dia., which in this case have tee slots cored radially and square scotching holes all over. The works have never yet received one where a tee-headed bolt could be passed down the tee slot, due to the cores having been burnt on or washed away, and the difficulty in machining out these is considerable, so much so that the works are now ordering the casting solid and then machining out the slots of the solid again, a very expensive process. The castings themselves are sandy, and have hard pellets in them, and in far too many instances are defective either on the face or round the rim. Here again rumour has it that the Americans seem to be able to produce far better steel castings for this particular purpose at any rate.

Bad Housekeeping

Why should a foundry be such a pig-sty? In nine out of ten foundries, particularly jobbing foundries, the general atmosphere is one of real bad housekeeping. The walls are generally cluttered up with boxes, the corner of the wall and floor strewn with gaggers, odd bits of core which have been sawn off, together with the usual odd bricks, patterns, core irons, and goodness knows what. Obviously, a dirty foundry must reflect on the mentality of those working in it, to the detriment of the work being produced, and that tidy orderly foundry makes for orderly minds. The difficulties under which many foundries labour are obvious, outstanding amongst which are the shortage of room for storage and probably finance, but the Author cannot help feeling that it should be possible to operate a foundry where only those boxes and those patterns being used at the moment are on the moulding floor, and where boxes are taken away to be knocked out and the sand sorted, mixed and

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freshened and brought back to the moulding positions in an orderly manner. It is appreciated that in the case of very large castings this cannot be done, but in how many foundries does one see practically every casting being knocked out where it was moulded and then carted away to one end of the foundry for knocking cores out and fettling, and then the sand left at the moulding place to be sorted and riddled, thereby wasting the moulder's time?

The Foundrymen's Reply

MR. A. S. WORCESTER, of Huddersfield, Past-President of the West Yorkshire Branch of the Institute of British Foundrymen, submitting a considered reply on behalf of the foundry side of the industry, said Mr. Eastwood had truly remarked at the outset that he supposed the engineer expected miracles of the foundryman, though not actually demanded. Under the circumstances of the very candid commentaries made, it was perhaps lucky for the foundrymen that evening that Mr. Eastwood had confined himself more or less to casting for machine tools. Foundrymen expected to have to make the engineer many other types of product—pressure castings, heat-resisting, acid-resisting cylinders (petrol, gas and steam), fin-cooled and water-cooled, etc. These came readily to mind. It was up to foundrymen now to convince Mr. Eastwood that the foundry could meet his modest requirements. Obviously, there was the necessity of liaison between drawing office, patternshop and foundry and machine shop. This had probably been reiterated at Institute meetings more than any other subject. There still were, however, over-complicated designs, irregular thicknesses, large bosses on thin sections, etc. These complicated moulding troubles, together with the specification of material for the job, sometimes made it nearly a miracle to produce sound- and stress-free castings. The machine shop then followed with the question, "How can it be machined?" Doubtlessly most foundrymen could quote recent examples of these problems.

Foundrymen appreciated the compliment paid to the skill of the craftsmen in the foundries that have produced the large machine-tool castings in this district. It was probably unique for such deep and heavy castings to be produced—mostly in greensand—of such good quality and to so fine limits of accuracy. They also deprecated the fact that the younger craftsmen were not coming along to take the older craftsmen's places to the extent desirable. Mr. Eastwood instanced two foundries making the same casting in different ways. This was not unusual, for there was usually an alternative, both producing a sound job. He could not agree that there were not many districts able to produce such castings. A modern heavy shop, with scientific control and access to the foundry publications and research, would meet the demand. In furtherance of the production of large castings to a specification, Mr. Eastwood gave his experience of the production of a given Brinell. Denseners and suitable mixture or alloy, plus knowledge of camber, were the cure. Camber probably was arrived at by trial and error, but the other means were available in most foundries of repute. Alloys and prices are factors entering into it. Separate slides were becoming more common, and flame hardening, as mentioned by Mr. Eastwood, had been successful, though in the matter of hard iron and good wear it should be remembered that it was wear which was essential.

Jig location was a vital factor. Co-operation again between the foundry and machine shop was required to allow chosen points which were fixtures on the pattern. Patterns must be taken care of. Moisture swelling a pattern, or a crack from the rapping bar, would shift the location points. The jig for the first operation should allow for checking up with the other dimensions. Machine-moulded castings were usually within very fine limits on the location points.

British or American Production

The vital question of British or American production had been raised. For British foundrymen he claimed as high a standard of repetition castings as any country in the world. Drying cores on formers was a common practice. Other points, such as moisture content and density of the sand mould, perfect patterns, jig assembly of cores, were all employed in producing a good casting. Shot-blasting and sometimes heat-treatment add to the appearance. The point raised on light castings—fluid iron, the correct sand and proper production methods would produce them. The Scots were the pioneers of the light-castings trade, but the Birmingham area of the Midlands could also be cited, particularly for the small intricate castings, including electrical and the motor-car and lorry industries. It is agreed they are specialists and have given really good castings at a surprisingly cheap rate. The jobbing foundries would be wise to leave the specialities to the specialists.

It appeared that the engineers still had a grouse about foundries not delivering complete batches, and getting the heavy plain castings first. This complaint should not be allowed to continue, and there was no reason why a foundry should not put its house in order in that respect. One could appreciate Mr. Eastwood's method of overcoming the difficulty.

For the purchase of castings price per cwt. was a bad method. Unit buying was better, but the jobbing foundry had something to face in quoting unit prices for oddments of a mixed variety. Varying weights for castings, particularly heavy ones, could usually be agreed upon within plus and minus tolerances. On fabricated structures as against castings, these must be looked upon as being established. No doubt a "new broom sweeps clean" could be applied here. Many fabricated parts have had to be replaced by cast iron. Stresses and vibrations were two of the factors causing this. Many jobs designed for fabrication could have been cheaper and better made in cast iron from the same plain design. Mr. Eastwood did give the foundryman a pat on the back for some of the high duty irons, and no doubt many more uses will be found for these. Mr. Eastwood had apparently

been unfortunate in his steel castings, for vast strides had been made in their quality and appearance during the past few years. A few steel founders were needed at the meeting to put Mr. Eastwood at ease on that matter.

Mr. Eastwood's parting shot was straight from the shoulder and no doubt to some extent deserved. Jobbing foundries were a mucky lot. Shortage of unskilled labour during the war had aggravated the evil, but much needed doing to educate the owners in this direction. Probably the Institute was one of the best means to achieve this end. As soon as order and cleanliness could be shown to pay things would move. Limited capital and small returns on the investment were auxiliary to bad housekeeping. In this district many working proprietors had been working 30 or 40 years and were still at it. He had still to meet a local retired foundryman! The Institute, in conjunction with other foundry associations, were helping through the Board of Education and the Board of Trade to bring about better foundry conditions.

In conclusion, as a foundryman, he believed the foundries could rise to the occasion. The higher strengths of iron, the meticulously dimensioned castings, and the better appearance, were amongst the forward strides made during the past few years. A more organised effort was being made to make the foundries better to work in, lighter, cleaner, more hygienic, than had ever been done before. The Institute was probably the biggest factor to achieve this end. The technically trained young men who had come, and were coming, into the industry were an enlightened class, and the future of the technical and administrative side was safe in their hands. The craftsmen and the future were another problem—the lads were not coming in on this side as one would like. To get them and keep them the foundry atmosphere must be improved. In spite of this big drawback, which it was hoped to remedy, he still thought the foundry could give the engineer what he needed.

A lengthy discussion ensued, in which Messrs. J. Timbrell (senior vice-president), G. W. Nicholls, H. Forrest, N. C. Ashton, and others followed, and thanks to Mr. Eastwood and Mr. Worcester were expresesd on behalf of the meeting by Mr. F. K. Neath.

NEW CATALOGUE

X-Ray Apparatus. The Industrial X-Ray Department of the Palmer Tyre, Limited, Penfold Street, Edgware Road, London, N.W.8, have sent us a 16-page, well-illustrated brochure, which serves as an excellent introduction to the subject of a non-distinctive method of testing castings, welds and plastics. There are still many hundreds of foundrymen who regard X-ray testing as a research apparatus for the larger concerns, instead of a workshop tool for all progressive concerns. Copies are available for our readers on writing to Edgware Road.

MEADVILLE MALLEABLE IRON COMPANY, of Philadelphia, are now employing a hundred German prisoners of war as labourers.

HOLLOW-WARE AND KITCHEN HARDWARE

NEW PROVISIONS FOR ALUMINIUM HOLLOW-WARE

During the past two months, the Board of Trade have been licensing manufacturers to make and supply certain types of aluminium pans and kettles. Two Orders have now been made, prescribing the marking and maximum prices of the licensed types, and revoking the present prohibition on the supply of aluminium hollow-ware by wholesalers.

The prices are based on the prices for aluminium sheet ruling up to March 1 because a reasonable time must be given to manufacturers for the conversion of stocks of sheet bought at those prices. The maximum prices for aluminium hollow-ware will, however, be revised in due course in accordance with the reduction in aluminium prices, which becomes operative on March 1.

The first Order, the Hollow-ware and Kitchen Hardware (Control of Manufacture and Supply) (No. 4) Order, 1945 (*a*), which applies mainly to manufacturers, revokes and re-enacts in a more convenient form the main provisions of the three previous Orders, namely the Hollow-ware and Kitchen Hardware (Control of Manufacture and Supply) Order, 1942, and the No. 2 and No. 3 Orders of 1943 which amended it. (*b*) The control on the manufacture and the supply by the manufacturer of hollow-ware wholly or mainly of metal, and of certain types of kitchen hardware, is unchanged. The provisions relating to the marking and price control of enamel-ware remain the same, and for this reason the schedule of enamel-ware, published in the No. 3 Order of 1943, has not been reprinted in the new Order.

Manufacturers are reminded that, by definition, "manufacture" includes the carrying out of any process in the manufacture of controlled goods, and that, in consequence, no person may carry out any such process without a licence issued to that person by the Board of Trade. Any such licence applies only to the person named on the licence.

CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

CAST STEEL WELDING STICKS

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—I wonder if you will be so good as to help me with some information. I am wanting to cast some alloy steel welding sticks about ¼ in. dia. by, say, 10 in. long, and so far I have had little success. A very large quantity is required. No doubt when one knows how to do it, it will be fairly easy, and if you can be of assistance in this direction it will be appreciated.

Thanking you in anticipation.

Yours, etc.,
W. F. DORMER.

58, Roseville Road, Leeds.
February 24, 1945.

[Why not use wire?—EDITOR.]

ECONOMY OF TIME AND SKILL

By W.G.

It is becoming the practice with some moulders to substitute parts of greensand moulds with cores, the explanation being that there is a saving of time or a simplifying of moulding operations with jobs that would otherwise require careful and skilful attention. The method employed is to have a core or cores made from those sections of the pattern where it is considered there is the possibility of a defect occurring which may be the cause of a waster. The sketches here shown are of two castings recently produced by this method.

Fig. 1 is a box-like casting of plain design, and can be moulded so that the inside, or greensand core, will be left on the bottom part when the pattern is withdrawn or, alternatively, to gagger the inside and lift it away with the top part. The moulder working the job was of the opinion that it was much more simple

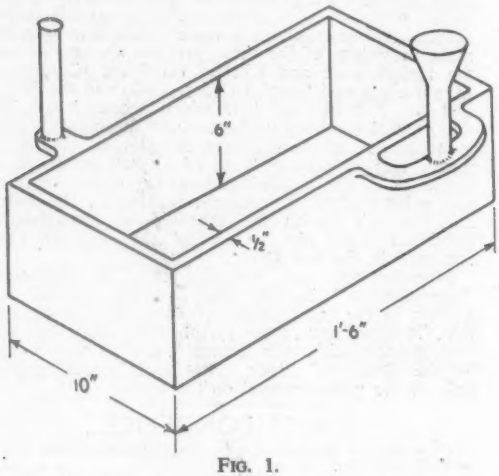


FIG. 1.

to make a core from the inside of the pattern and when dry to position it in the mould on three ½-in. studs.

Fig. 2 represents a circular casting which must be free from imperfections on the outside when machined, and so must of necessity be poured with high-temperature iron. It will be readily understood, therefore, that to make the whole of this mould in greensand careful preparation and skill are required in the various operations if a sound and clean casting is to result. With this pattern also the moulder considered it easier and much safer to rely on two cores to form those sections of the mould shown at A and B. The procedure in this case consisted in ramming up the core B with the pattern so that it was central when the pattern was withdrawn. The centre core is then set and the core A placed on three 1-in. studs which determines the thickness of the plate connecting the boss. This core also could have been rammed up with the top part and secured to it with wire making the use of studs unnecessary.

When making the top core A a hole was left in the boss for the purpose of a riser and feeding. The casting weighed 2¼ cwts. and was poured by means of three pencil gates, ½ in. dia.

INSTITUTE OF PHYSICS

Physicists employed in industry in South Wales and the surrounding district have for some time felt the need of local opportunities for the interchange of knowledge and experience of applied physics. At their request the board of the Institute of Physics has therefore authorised the formation of a South Wales Branch

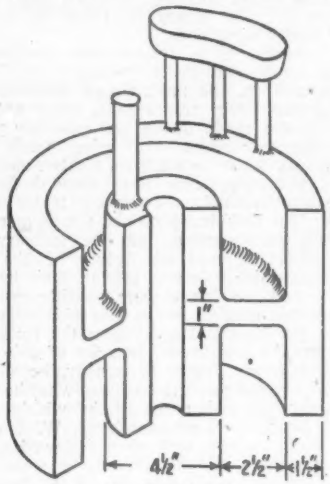


FIG. 2.

of the Institute which is to be centred on Swansea. The inaugural meeting of the Branch will take place on March 10 at 2.30 p.m., in the Physics Department of University College, Swansea, when Dr. C. Sykes, F.Inst.P., F.R.S., a member of the board of the Institute and Principal of the Brown-Firth Research Laboratories, Sheffield, will deliver an illustrated lecture on "Physics in Metallurgy." Visitors will be welcome; admission is free and without ticket.

Further particulars of the Branch may be obtained from the acting hon. secretary, Dr. T. V. I. Starkey, The Technical College, Mount Pleasant, Swansea.

AMERICAN PRODUCTION of steel in 1944 attained the record level of 89,500,000 net tons.

SOME OBSERVATIONS ON THE STRUCTURE OF ACID-RESISTANT VITREOUS ENAMELS FOR CHEMICAL PLANT

High-frequency spark test and the detection of voids in enamelled coatings

By G. E. CHARLISH, B.Sc., F.R.I.C. and E. J. HEELEY, Assoc. Met. (Sheff.)

(*Continued from page* 152.)

Characteristics of Defects Revealed by High-Frequency Spark Test

Many examples of local defects in enamel coatings have been located by the high-frequency spark test and prepared for microscopical examination in the manner already described. This has revealed that the majority of defects, whether in chemically acid resistant or domestic enamels, applied on mild steel or cast iron, are frequently elongated. Hence the point of contact with the basis metal may not be situated precisely below the flaw in the surface of the enamel. In such cases it is not possible to illustrate these two features on the same photomicrograph.

One type of elongated void is shown in Fig. 19 where two adjacent voids have united, thus providing an elongated cavity. Despite the large size of the dis-

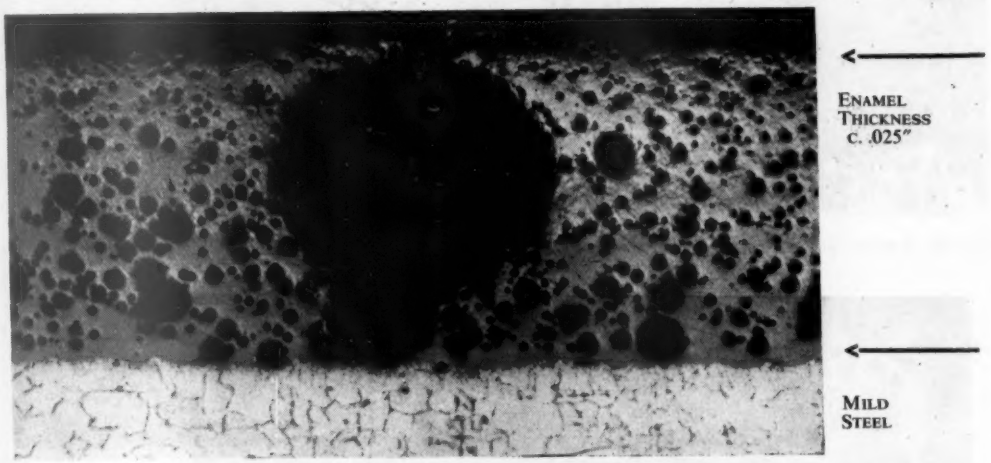


FIG. 17.—LARGE VOID IN ENAMEL ON MILD STEEL. "WET SPRAY" COMMERCIAL ACID-RESISTANT ENAMEL USED FOR DOMESTIC PURPOSES. × 75.

are large voids, generally extending through the full thickness of the coating to the metal beneath.

Characteristic examples of these are given in Figs. 17 and 18, the former being a domestic acid-resisting enamel applied on mild steel, whilst the latter is a "chemical plant" acid-resistant enamel applied on cast iron. It may be remarked that the void shown in Fig. 18 does not occupy the full thickness of the enamel, *i.e.*, it does not appear to penetrate to the basis metal at the particular cross section shown, but in this connection it should be mentioned that these large voids are not necessarily of spherical shape, but continuities in the enamel coating, a very thin film of enamel has remained intact at the surface at the region illustrated although the surface was actually broken a short distance away.

Although the majority of defects in enamel coatings revealed by the high-frequency spark test are large discontinuities of the type shown in Figs. 17, 18 and 19, the test occasionally indicates the presence of a metallic fragment in the enamel, such as that shown in Fig. 20. The presence of a metallic particle is only detected by the high-frequency spark test when a complete path occurs between the basis metal and the

Acid-resistant Vitreous Enamels

outer surface of the enamel. The path consists of voids as well as the metallic fragment.

The occurrence in enamel coatings of the "craze" cracking illustrated in Fig. 5 is revealed by visual examination, although the cracks are not necessarily indicated as flaws by the high-frequency spark test. There are, however, positions on some cracks at which the high-frequency spark indicates a flaw in the enamel, which subsequent microscopical examination has shown to be a crack, either (*a*) linking up with voids in the enamel, or (*b*) of sufficient width to permit ready access of corrosive media to the basis metal.

An example of the former type is given in Fig. 21, which shows a defect which, on the surface of the enamel, appeared to be no different from other "craze" cracks. On cutting a section and examining the enamel, it was evident that at the position indicated as faulty by the high-frequency spark test, the "craze" cracks formed a path between the voids in the enamel coating.

As a matter of interest, illustrations are also given of typical "craze" cracks which were not revealed as defects by the high-frequency spark test, these being shown in Figs. 22 and 23 respectively. Microscopical examination demonstrated that both cracks shown in

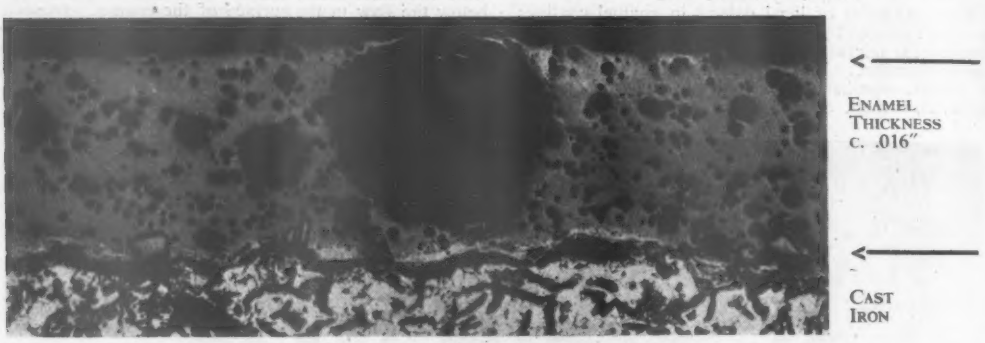


FIG. 18.—LARGE VOID IN ENAMEL ON CAST IRON. "HOT DUST" COMMERCIAL ACID-RESISTANT ENAMEL USED FOR CHEMICAL PURPOSES. × 75.

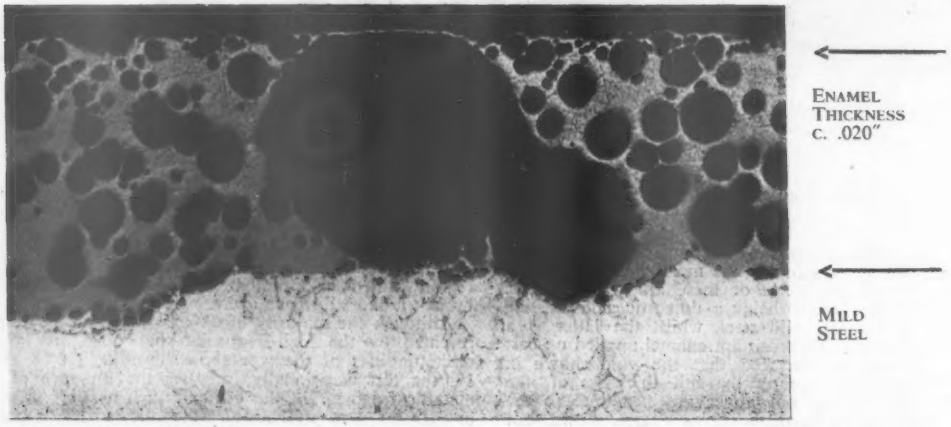


FIG. 19.—LARGE VOID IN ENAMEL ON MILD STEEL. "WET SPRAY" COMMERCIAL ACID-RESISTANT ENAMEL USED FOR CHEMICAL PLANT PURPOSES. × 75.

Fig. 22 had reached the basis metal. The complete penetration of the enamel coating is not, however, a necessary feature of all "craze" cracks. A more accurate idea of the actual width of these extremely fine cracks will be obtained from an examination of Fig. 23, a photomicrograph taken at a magnification of 350 diameters, showing a portion of the left-hand crack illustrated in Fig. 22. It will be evident from a consideration of the actual width of the crack (approximately one five-thousandth of an inch) that access of liquid to the basis metal must be extremely limited.

"Craze" cracks appear to be attributable to overstress in the enamel layer. They do not appear to be characteristic of good-quality enamellings as received from the suppliers, although the presence or absence of residual stress in the enamel cannot be omitted from consideration. The cracks are obvious weaknesses in the enamel coatings, particularly because of the tendency for the enamel between adjacent cracks to flake away from the basis metal.

Personal experience with commercial acid-resistant enamels indicates that the large void defects as illus-

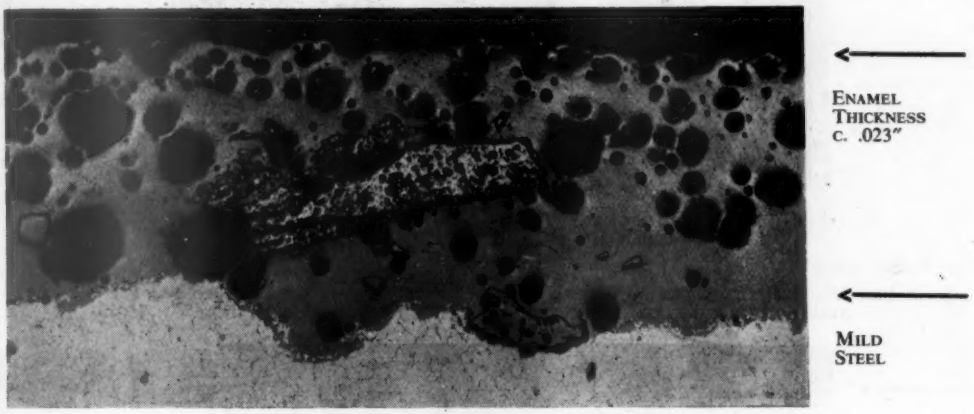


FIG. 20.—METALLIC FRAGMENT IN ENAMEL ON MILD STEEL. "WET SPRAY." COMMERCIAL ACID-RESISTANT ENAMEL USED FOR CHEMICAL PLANT PURPOSES. × 75.

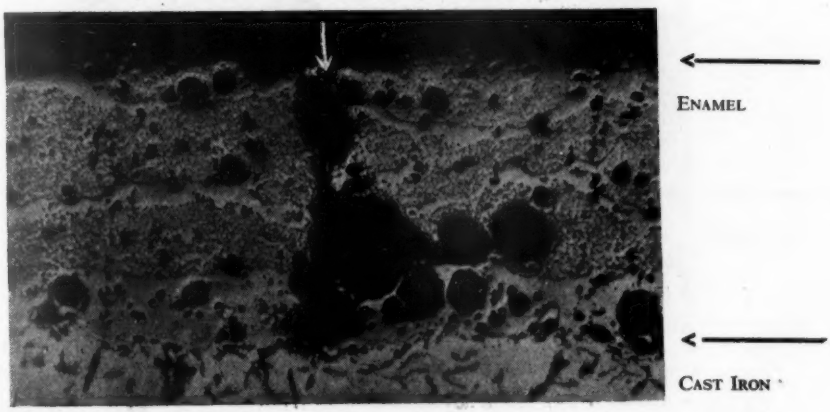


FIG. 21.—THE "CRAZE" CRACK INDICATED BY THE ARROW LINKS UP WITH VOIDS IN "HOT DUST" ENAMEL ON CAST IRON. THIS DEFECT WAS REVEALED BY THE HIGH-FREQUENCY SPARK TEST. × 75.

trated in Figs. 17, 18 and 19 are the most common type of defect encountered in enamel coatings. These defects occur in a most irregular manner; it is not uncommon to find relatively large areas free from defect, whilst in other cases a large number of faults may be present in a small area. Such defects are not likely to be detected by visual examination owing to

FIG. 22.—TYPICAL "CRAZE" CRACKS IN "HOT DUST" ENAMEL ON CAST IRON. THESE WERE NOT REVEALED AS DEFECTS BY THE HIGH-FREQUENCY SPARK TEST. × 75.

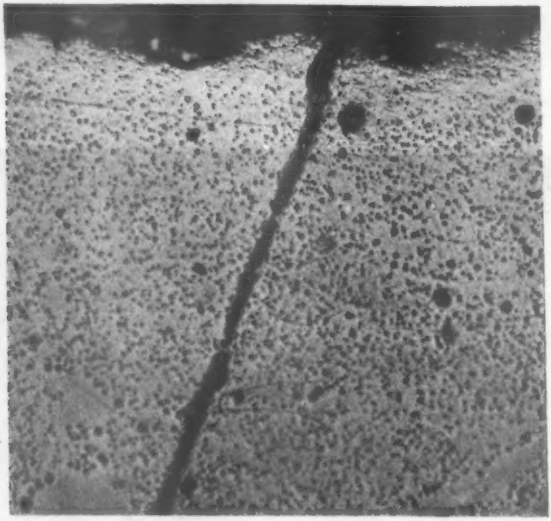


FIG. 23.—PHOTOMICROGRAPH SHOWING THAT THE ACTUAL WIDTH OF CRACK AT THE SURFACE OF THE ENAMEL WAS APPROXIMATELY ONE FIVE-THOUSANDTH OF AN INCH. × 350.

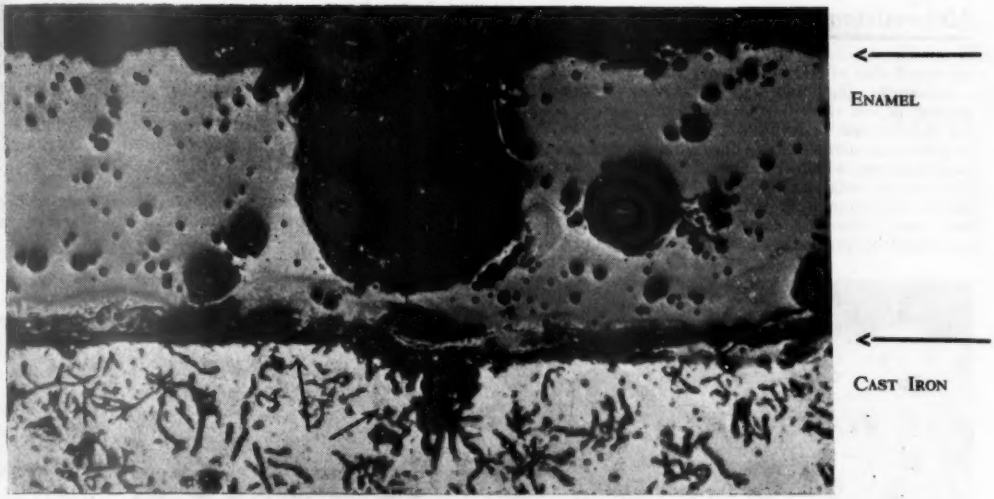


FIG. 24.—LARGE VOID DEFECT IN ENAMEL ON CAST IRON. THE GROUND COAT AND BASIS METAL HAVE UNDERGONE CORROSION ATTACK AT THE POINTS INDICATED BY THE ARROWS. × 75.

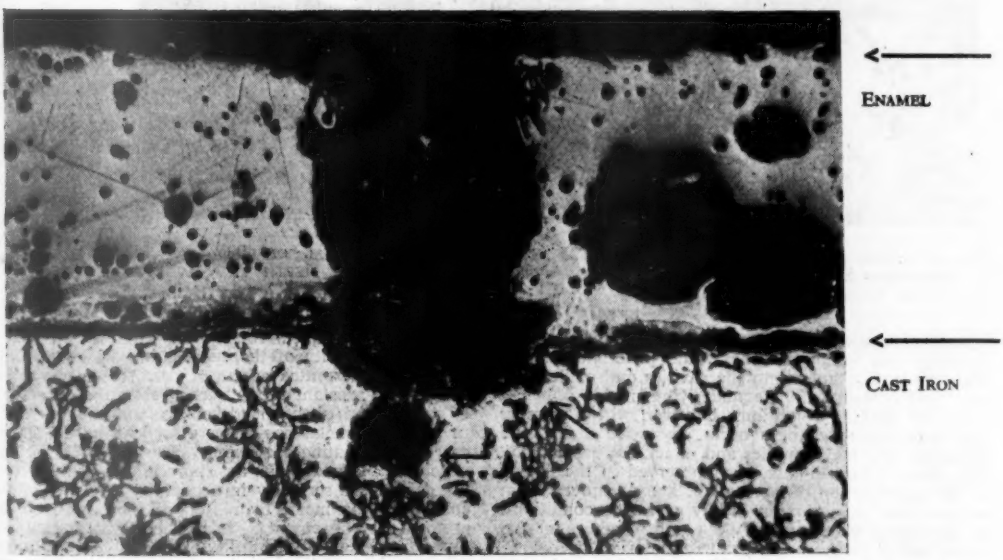


FIG. 25.—SAME SPECIMEN AS SHOWN IN FIG. 24 AFTER REMOVAL OF 0.003" OF MATERIAL FROM PREPARED SURFACE. THE METAL AFFECTED BY CORROSION ATTACK IS INDICATED BY THE ARROWS.

Acid-resistant Vitreous Enamels

the small size of the hole at the surface of the enamel.

Generally, the hole visible at the surface of the enamel is less than 0.01 in. in width, and even under the microscope it is almost impossible to distinguish between an actual hole and other harmless surface imperfections which are found in most enamels. In view of the small area of the break in the outer surface of the enamel, it will readily be understood why the "wet" electrical tests are not to be relied upon to reveal the presence of serious discontinuities in the enamel, because, in the normal testing procedure, it is unlikely that sufficient brine would penetrate through the tiny surface holes into the cavities and make good electrical contact with the underlying metal.

Under working conditions, however, where pressure and temperature changes occur, corrosive media will penetrate into these cavities and attack the basis metal. This feature has, in fact, been observed in the course of the examination of some plant items removed from service after operation in mildly corrosive conditions. A characteristic example of the result of access of corrosive media to the basis metal is given in Figs. 24, 25 and 26, which show three different sections taken at one of the large void defects. From the first illustration, Fig. 24, it will be observed that some corrosion of the basis metal had taken place at the bottom of the void, whilst at the section illustrated in Fig. 25, which shows the same specimen as Fig. 24, but after the careful removal of three-thousandths of an inch from the prepared surface at this region, a greater amount of basis metal has been affected by corrosion wastage. At the position shown in Fig. 26, which is an illustration of the same specimen shown in Fig. 25, but after the removal of one two-hundredth of an inch from the prepared surface, a still greater depth of basis metal has been attacked by the corrosive media.

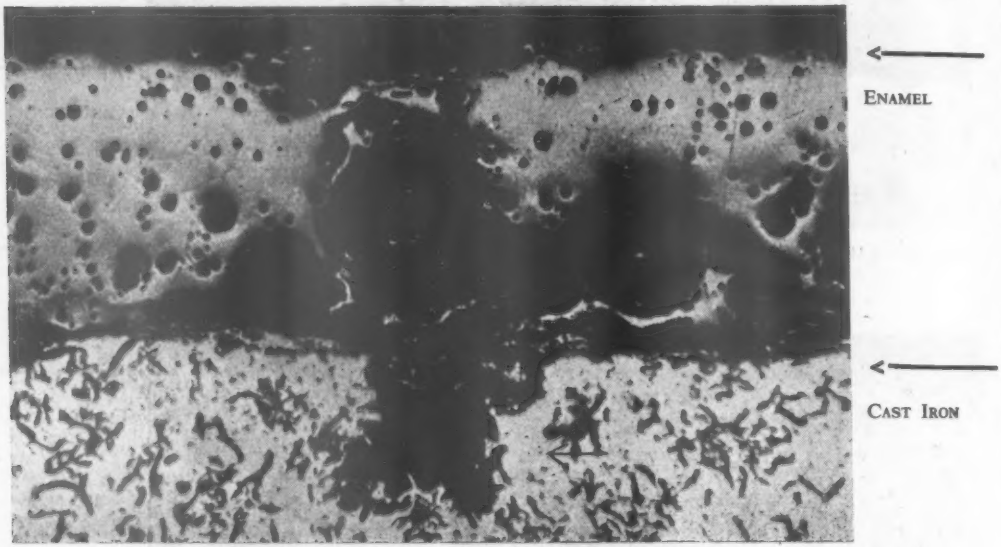


FIG. 26.—SAME SPECIMEN AS SHOWN IN FIG. 25 AFTER FURTHER REMOVAL OF .005" OF MATERIAL FROM POLISHED SURFACE. THE BASE METAL IS AFFECTED TO A GREATER DEPTH THAN IN FIGS. 24 AND 25. × 75.

These three typical illustrations demonstrate that a large discontinuity of the type shown in Figs. 17, 18 and 19 has permitted access of corrosive media either to the less resistant ground coat below the cover coat of enamel and/or the metal beneath, and that corrosion of the basis metal has taken place despite the mildly corrosive operating conditions. The corrosion wastage which has extended for an appreciable distance from the defect, has seriously impaired the adhesion of the enamel to the metal by reason of the attack on the ground coat of enamel. It will be evident that the rate of wastage of the basis metal due to the access of corrosive media will be dependent on operating

(*Continued overleaf, column* 1.)

SOME OBSERVATIONS ON THE STRUCTURE OF ACID-RESISTANT VITREOUS ENAMELS FOR CHEMICAL PLANT

(*Continued from previous page.*)

conditions, and that more serious wastage of the basis metal than that shown in Figs. 24, 25 and 26 would occur under more corrosive conditions.

Conclusions

The Authors' investigations into commercial acid-resistant enamels as applied to plant items for chemical plant purposes has enabled the following conclusions to be drawn:—

(1) Whilst some of the flaws encountered in commercial acid-resistant enamel coatings may be observed by careful visual examination, other serious discontinuities may be present undetectable by visual examination.

(2) These discontinuities are in the form of cavities, generally approximately spherical in cross section extending through the full thickness of the enamel coating. These are such that they provide a means of access of corrosive media to the basis metal.

(3) The discontinuities referred to are readily detected by the application of the high-frequency spark test.

(4) "Wet" electrical test methods are not to be relied upon as a means of detecting the presence of the discontinuities in enamel coatings.

(5) The large void defects are not peculiar to any particular type of enamel, and have been observed in chemically acid-resistant enamels as well as those manufactured for domestic purposes. They occur haphazardly in enamel coatings on cast iron, mild steel and deposited weld metal (mild steel quality).

(6) The presence of large void defects in commercial acid-resistant enamel supplied for chemical plant is a most serious factor in bringing about premature failures of enamelled plant items employed in corrosive media. The provision of enamels free from the type of large void discontinuity described above is essential if the use and development of enamelled plant in the chemical industry is to be extended.

NEW STANDARDS ISSUED

The monthly information sheet for January of the British Standards Institution announces that a revised standard has been issued in connection with 460:1944 cast-iron spigot and socket rainwater pipes, fittings and accessories. It costs 3s. 6d. New work has been started on the revision of B.S. 1091, pressed steel galvanised rainwater gutters, pipes and fittings.

PRESSURE ON FOUNDRIES for the production of grey-iron castings shows no tendency to slacken, according to the latest advices from America. Despite this, permission has been given to produce 50,000 bath tubs in the first quarter of this year.

CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

PRESSURE AND SOUNDNESS

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—I wonder whether you will afford me a little of your valuable space to inquire of your readers for an explanation of the effect of pressure in producing soundness in iron castings? It is common knowledge among practical foundrymen that increase of head height makes for increased soundness, but the reason is much harder to seek.

In cases where it is a known fact that runners and risers have frozen long before the casting itself, the effects of different head pressures have been most marked, and if one visualises liquid metal as any other liquid, there can be no actual compression of the molten metal which is directly attributable to the additional pressure. Where runners and risers have frozen before the casting, there is no medium for conveying feed metal, and yet castings can often be made perfectly satisfactorily with a few additional inches of head that would otherwise prove unsound. A simpler statement of the case would be that *apparently* the same amount of metal enters the mould in both instances and, while the deeper head will provide a sound casting, the short head will not.

Without introducing my own theories, I should be very grateful for the assistance of any reader capable of offering an explanation of the effect of head pressure.

Thanking you, sir, and looking forward to the assistance of your readers.—Yours, etc.,

"YORKIST."

HISTORICAL MATERIAL WANTED

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—In co-operation with the American Foundrymen's Association, the writer is engaged in developing a thesis on the history of the casting industry. Naturally, much of our bibliography already investigated reverts to English manufacture of non-ferrous and ferrous castings. I am writing to you with the request that perhaps some of your readers could assist me in forwarding material which they believe to be of interest in such a text. To the best of the writer's understanding, there has been no such work promoted. I realise that it is a large subject, and I am only asking for material immediately available.

I am particularly interested in photographs and descriptions of old moulding and pouring practices. Full credit, of course, will be given to the individuals or societies participating in this work, and any cost involved will be cheerfully forwarded upon request.

Yours, etc.,

B. L. SIMPSON
(President, National Engineering Company).

549, West Washington Boulevard,
Chicago 6, Illinois, U.S.A.
February 6, 1945.

AFFORDING TAX RELIEF TO INDUSTRY

PROVISIONS OF NEW INCOME TAX BILL

The Income Tax Bill which was issued recently will give effect to the proposals outlined by the Chancellor of the Exchequer in his last Budget speech for affording tax reliefs to industry in the period of reconstruction after the war. The main proposals are:—An initial allowance of 10 per cent. of the cost of new industrial buildings, and an annual allowance of 2 per cent. to write off the balance of the cost; an initial allowance of 20 per cent. of the cost of new plant and machinery, and an increase in the annual allowance; a depreciation allowance for mines and oil wells to write off the cost of capital assets whose life is limited by the life of mineral or oil deposits; an allowance to write off the cost of patent rights, and a corresponding charge on the vendor, and an extension of the allowance for expenditure on scientific research and for exceptional depreciation of buildings, plant, etc.

The Chancellor, in his Budget speech, promised that these tax reliefs should operate after the war, but, while it is still proposed that the Bill should come into effect after the war, from an "appointed day" to be fixed by Parliament, the Bill provides that the new allowances shall apply retrospectively to expenditure on buildings, plant, and machinery incurred since April 1, 1944. Another improvement is that the initial allowance of 20 per cent. of the cost of new plant and machinery is to be extended to cover second-hand machinery, providing that it is newly installed for industrial purposes.

Workers' Houses

The new "industrial buildings" to which the allowances will apply are defined as including premises used for productive industry and transport and for the welfare of the workers. Welfare buildings will include works' sports pavilions. Retail shops and offices are excluded. The allowances will also apply to expenditure on houses built for workers at mines or oil wells if the houses are likely to become valueless when the mine or well is exhausted. The combined effect of the initial allowance and the annual allowance for new industrial buildings is that the cost will be written off over a period of 45 years. Provision is made for earlier writing off if buildings are scrapped earlier.

The ordinary annual allowance for plant and machinery will be increased by one-fourth in place of the existing addition of one-fifth. Provision is made for earlier writing off if plant and machinery are scrapped or replaced. For mines and oil wells there will be an initial allowance of 10 per cent. of the cost of construction of works likely to become valueless when the source is no longer worked; with an annual allowance designed to write off within the same period the cost of capital assets whose life is limited by the duration of the mineral or oil deposits.

There is to be an annual allowance in respect of capital expenditure on the purchase of patent rights after "the appointed day." This allowance will be given on the basis of spreading the expenditure over 17 years, or the life of the patent if shorter. A corresponding charge, on the basis of a spread of six years, is to be made on the seller of the patent. Provision is made for the earlier writing off of patents sold or lapsed.

The allowance provided in last year's Finance Act for scientific research expenditure is to be extended to payments made after April 6, 1944. An allowance will also be made for capital expenditure on buildings, plant and machinery for research incurred after January 1, 1937.

WARTIME RISE IN WAGES

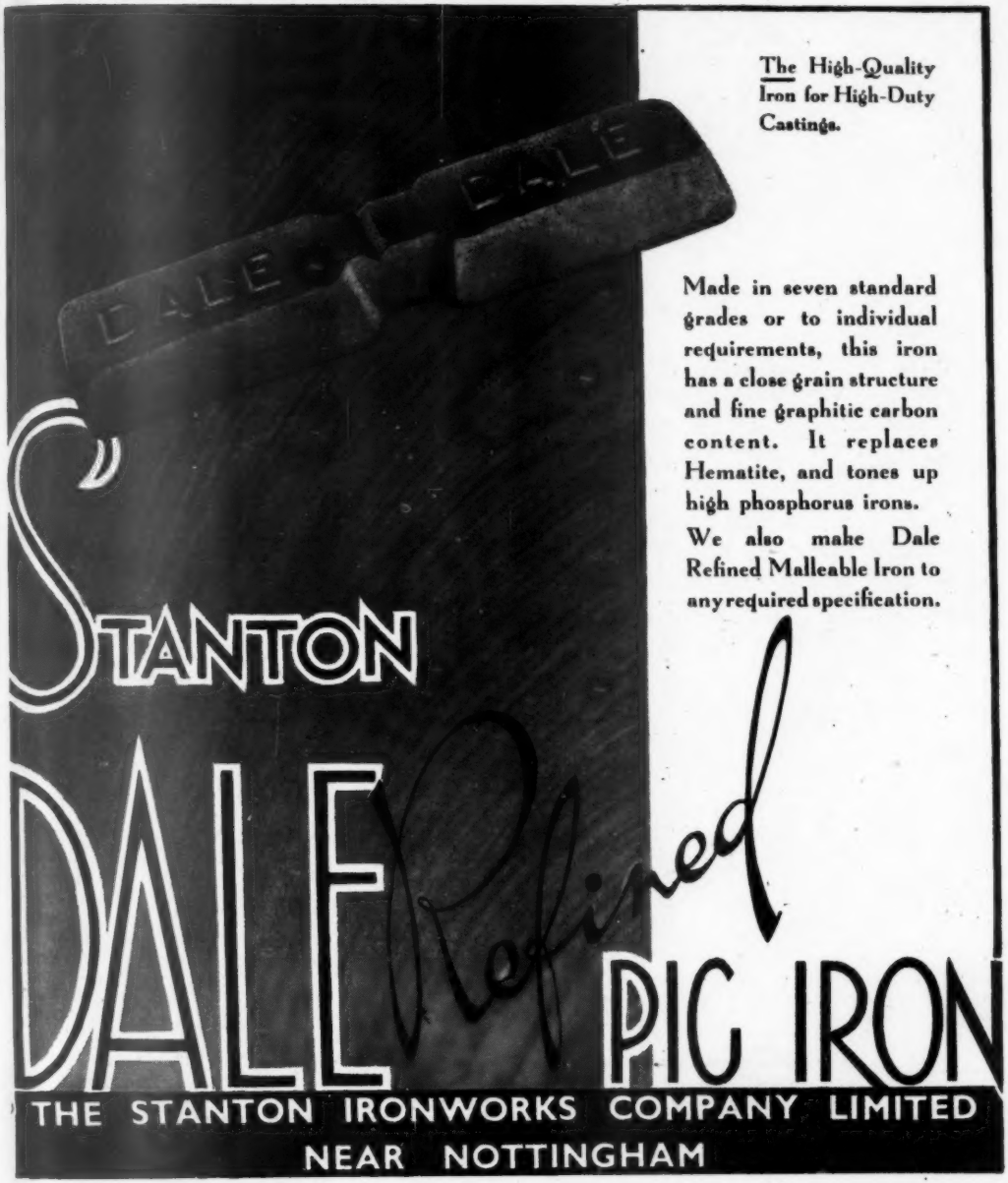
MAN-POWER IN 1944

The "Ministry of Labour Gazette," in its industrial review for 1944, estimates that changes in wages during the year resulted in an aggregate net increase of approximately £1,850,000 in the weekly full-time rates of over 8,000,000 workpeople, compared with a net increase of approximately £1,400,000 in the weekly wage rates of 6,500,000 workpeople in the same industries during 1943. It is estimated that at the end of 1944 the average level of full-time weekly rates of wages in all the industries, including agriculture, was about 5 per cent. higher than at the end of 1943 and about 45 or 46 per cent. higher than at the beginning of the war.

The needs of industry continued in 1944 to absorb the whole of the available man-power, and there was widespread shortage of labour. Towards the end of the year there was a slight rise in the numbers of persons on the registers of the employment exchanges, largely owing to the registration of fire-watchers released from private employment. At October 16 last, the latest date for which figures are available, the total number of persons registered as unemployed in the United Kingdom, exclusive of about 18,400 who had been classified as unsuitable for ordinary employment, was approximately 93,300, compared with 86,500 at October 18, 1943, and 118,800 at October 12, 1942.

Industrial disputes, involving stoppages of work, reported as having begun in 1944 in the United Kingdom, numbered 2,185, compared with 1,785 in the previous year. The total number of workpeople involved was about 830,000, of whom about 105,000 were indirectly involved. In 1943, about 560,000 were involved in all stoppages in progress. The aggregate number of working days lost in 1944 is estimated at about 3,700,000, compared with about 1,800,000 in 1943. The coal-mining industry accounted for more than one-half of all these stoppages, and for two-thirds of the aggregate number of working days lost.

THE CORNISH ENGINES PRESERVATION SOCIETY, over which Viscount Falmouth presides, has launched an appeal for a minimum of £5,000 to enable it to purchase and house further examples of these wonderful engines. Donations should be sent to Mr. W. Tregoning Hooper, Falmouth Observatory.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DALE
DALE
Made in seven standard grades or to individual requirements, this iron has a close grain structure and fine graphitic carbon content. It replaces Hematite, and tones up high phosphorus irons.
We also make Dale Refined Malleable Iron to any required specification.
STANTON
DALE Refined PIG IRON
THE STANTON IRONWORKS COMPANY LIMITED
NEAR NOTTINGHAM

PERSONAL

MR. V. J. RADBONE has been elected a director of Associated Electrical Industries, Limited.

MR. E. H. WOOTTON has resigned from the board of Harris & Sheldon, Limited, Birmingham.

MR. C. W. HAYWARD has been appointed chairman of Lea-Francis Engineering (1937), Limited.

MR. HARRY H. TAYLOR, a partner in the firm of Hawkins & Company, Crown Foundry, Dudley Port, Tipton, Staffs, has been appointed a Justice of the Peace for the County of Stafford.

SIR ALEXANDER AND LADY WALKER, of Piersland, Troon, celebrated the 50th anniversary of their wedding recently. Sir Alexander is a director of Glenfield & Kennedy, Limited, hydraulic engineers and founders, of Kilmarnock.

MR. M. H. TOLLIT, a director of Guest, Keen & Nettlefolds, Limited, will from March 1 act as general manager of the company's bolt and nut section, Atlas Works, Darlaston, following the resignation of MR. RICHARD BEESLY, who has acquired control of F. W. McConnell, Limited, engineers, Martley, Worcs. SIR ANTHONY BOWLBY, BT., has been appointed general manager of the screw department of Guest, Keen & Nettlefolds, Limited, as from the same date.

MR. H. C. PIERSON has retired from his position as general sales manager of Metropolitan-Vickers Electrical Company, Limited, but retains his seat on the board. MR. IVOR R. COX has been appointed general sales manager and also retains his present position as managing director of Metropolitan-Vickers Electrical Export Company, Limited. MR. DUNCAN MACARTHUR has been appointed deputy general sales manager, retaining his present position of home sales manager. He has also been elected to the board of Metropolitan-Vickers Electrical Export Company, Limited.

THE EARL OF DUDLEY relinquished the office of Midland Regional Commissioner as from the end of February, and the Home Secretary has accepted his resignation "with regret." The official announcement said that since the outbreak of war Lord Dudley has rendered a great public service to Civil Defence and to the war effort generally, and it is only the changed war situation which has made it possible for him to relinquish the post. Lord Dudley is chairman of the British Iron and Steel Corporation, Horseley Bridge & Thomas Piggott, Limited, Round Oak Steel Works, Limited, the Earl of Dudley's Baggeridge Colliery, Limited, and the Earl of Dudley's Slag Works, Limited, and is a director of Richard Thomas & Company, Limited, W. & T. Avery, Limited, the Great Western Railway Company. He is also on the board of several other companies.

SOME WORKERS in certain American foundries are to receive a 10-cent-an-hour increase. In general, this increase is to be given where there is a man-power shortage associated with urgency in the production of critical castings.

ZINC CORPORATION'S CAPITAL

In a statement issued recently, the board of the Zinc Corporation, Limited, indicates that capital reorganisation has now become imperative, in order that the company may be in a position to expand mining operations at Broken Hill, to develop its smelting interests at Port Pirie and, where possible, to extend the scope of ancillary industries with which the company is associated. Under the plan the £245,692 20 per cent. participating preference shares will be replaced by £736,076 of 5½ per cent. preference and £245,692 of ordinary shares.

Regarding mining operations, the directors state that the southern extensions of the Broken Hill lead-zinc-silver lode are believed to be mainly confined to the leases of the Zinc Corporation and those of its associate, New Broken Hill Consolidated, Limited, and it is essential that the mines of those companies should be developed and equipped so that replacement may be achieved of any reduction in the output resulting from diminution of ore resources elsewhere on the field.

The operating policy of the Zinc Corporation and New Broken Hill Consolidated is designed to meet these objectives and takes full account of the fact that, while the main leases of Zinc Corporation, under the present New South Wales law, are due to expire in 1964, those of New Broken Hill Consolidated are of longer tenure.

The latest surveys of the ore resources of the southern sections of the Broken Hill lode justify intensified development on the leases of both companies and this will involve considerable expenditure.

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"KEPI"—Hand tools. GEORGE PIKE, LIMITED, Alma Street, Birmingham.

"VALMET"—Metals. WELLWORTHY PISTON RINGS, LIMITED, 89, Blackfriars Road, London, S.E.1.

"BURNALIUM"—Metal furniture. BURNLEY AIRCRAFT PRODUCTS, LIMITED, Holmes Street, Burnley.

"BESTOBELL" AND DEVICE—Metals and alloys. BELL'S ASBESTOS & ENGINEERING, LIMITED, Slough, Bucks.

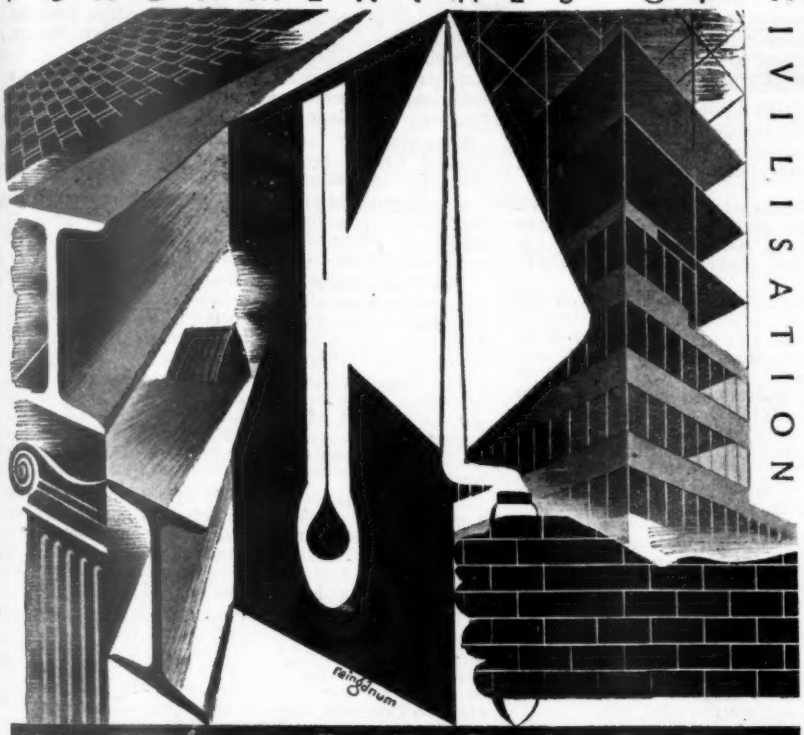
"EFCO"—Electric furnace installations. ELECTRIC FURNACE COMPANY, LIMITED, 17, Victoria Street, London, S.W.1.

"PUREFOY" AND ARMOURED KNIGHT DEVICE—Metals and alloys, and machine tools. PUREFOY ENGINEERING COMPANY, LIMITED, Upper Tilt Works, Cobham, Surrey.

"MARSHALL" AND "FIELD MARSHALL," WITH BATON DEVICE—Agricultural machines and road-making machines. MARSHALL, SONS & COMPANY, LIMITED, Britannia Iron Works, Gainsborough, Lincs.

"PROMETCOL," "NIPLAWNA," "PROKLENE," AND "PROFEROSCAL"—Chemical compounds for use in the treatment of metal surfaces in the course of manufacture. PROTECTIVE METAL FINISHES, LIMITED, 1, Chalcot Square, London, N.W.1.

FUNDAMENTALS OF CIVILISATION



THE UNITED STEEL COMPANIES LTD

No. 4 SHELTER

To possess a habitation is the common instinct of every living creature. Nature displays many marvels of ingenuity and constructive skill only surpassed by man. But the spider still spins its web as it did millions of years ago. Aeons of change and development in living organisms have added nothing to the materials of construction used by the birds, beasts, fishes and insects.

The highest product of evolution is man, who acquired reasoning powers which first enabled him to abandon the clammy caves for the warmth and comparative security of a wood and wattle hut. From these dim beginnings he learnt to make bricks from clay; to hew and carve the stone for temple and cottage. Yet, though he acquired skill to fashion rich architectural gems with greater spans of roof in wood and stone, his shelter was still earthbound.

With the advent of steel his imagination began to soar till now it has become essential to his needs in erecting structures of towering height. The progressive genius of man will find even greater scope in utilising the many forms of steel in the light, airy and spacious edifices for the cities of the future.

THE UNITED STEEL COMPANIES LIMITED

STEEL, PEECH & TOZER, SHEFFIELD
SAMUEL FOX & CO. LTD., SHEFFIELD
UNITED STRIP & BAR MILLS, SHEFFIELD
APPLEBY-FRODINGHAM STEEL CO. LTD., SCUNTHORPE
WORKINGTON IRON & STEEL CO., WORKINGTON
THE SHEFFIELD COAL CO. LTD.
THE ROTHERVALE COLLIERIES, TREETON
UNITED COKE & CHEMICALS CO. LTD.
THOS. BUTLIN & CO., WELLINGBOROUGH

U.S.P. 28

COMPANY RESULTS

(Figures for previous year in brackets.)

United Steel Companies—Interim dividend of 2½%, less tax (same).

J. W. Singer & Sons—Interim dividend (in lieu of final) of 10% (same).

Smith's Dock—Net profit for the year to September 30, 1944, £135,766 (£139,133); ordinary dividend of 6% (same); income-tax provision, £91,000 (£89,000); to general reserve, £10,000 (same); forward, £27,714 (£27,948).

English Electric—Net trading profit for 1944, £584,773 (£570,582); net profit, after fees, debenture interest and depreciation, £434,984 (£419,346); to general reserve, £100,000 (same); forward, £87,870 (£62,631).

Vickers—Final dividends of 2½%, less tax, on the preferred 5% stock, 2½%, less tax, on the 5% preference stock, and 2½%, tax free up to 6s. in the £, on the cumulative preference stock, making in each case 5% for the year.

John Shaw & Sons, Wolverhampton—Net profit to June 30, 1944, £15,392 (£13,977); to contingencies reserve, £10,000 (£5,000); provision for taxation, including subsidiary companies, £141,183 (£135,690); dividend of 7½% (same); forward, £15,750 (£16,501).

Burnell & Company—Trading profit for 1944, £41,426 (£45,006); depreciation, £6,000 (same); taxation, £6,750 (£10,000); net profit, £27,004 (£26,673); to general reserve, £5,000 (£7,000); participating dividend on preference shares of 1.568d. per share (same); ordinary dividend of 15% (same); forward, £29,815, (£25,712).

Mather & Platt—Profit for 1944, £377,100 (£435,970); depreciation, £44,438 (£45,731); income-tax and E.P.T., £130,000 (£190,000); net profit, £172,294 (£168,388); deferred repairs, etc., £17,650 (£17,320); written off shares in subsidiaries, £10,000 (same); to reserve, £25,000 (nil); final ordinary dividend of 6%, making 10% (unchanged); forward, £90,686 (£99,758).

CONTRACTS OPEN

Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Bacup, March 9—Iron castings for the 12 months ending March 31, 1946, for the Borough Council. Mr. H. Guffogg, borough engineer, Municipal Offices, Bacup.

Barry, March 10—Galvanised iron goods, sheeting, wire, etc., crown iron and mild steel, etc., for the period ending March 31, 1946, for the Town Council. Mr. J. Lloyd Davies, borough engineer, Town Hall, Barry.

Haslingden, March 10—Iron castings, etc., for the year ending March 31, 1946, for the Town Council. Mr. R. Taylor, borough surveyor, Municipal Offices, Haslingden.

Maesteg, March 10—Iron castings for the year commencing April 1, 1945, for the Urban District Council. Mr. Evan Davies, surveyor, Council Offices, Maesteg.

NEWS IN BRIEF

DAVID BROWN & SONS (HUDDERSFIELD), LIMITED, have opened an area office at 70, Queen Square, Bristol, 1.

THE GENERAL STEEL CASTINGS ASSOCIATION, after a reorganisation, is now to be known as the British Steel Founders' Association.

EMPLOYEES OF THE Grahamston Iron Company, Limited, Falkirk, last year made contributions to various funds amounting to over £620.

SIR THOMAS MILES, D.F.C., vice-chairman of the Nuffield organisation, is to be the principal guest at the annual dinner of the Keighley Association of Engineers, to be held on March 10.

THE CHANCELLOR OF THE EXCHEQUER is to be asked to receive a deputation from the Association of British Chambers of Commerce and the Federation of British Industries, which will make proposals for tax relief which it would like adopted in the next Budget.

THE TREASURY REGULATIONS concerning new issues of capital are to be maintained and in respect of the placing of stock the conditions are tightened up in respect of permission to deal, the Chancellor of the Exchequer announced in the House of Commons last week.

A MAJORITY SHAREHOLDING in Prince-Smith & Stells, Limited, textile machinery makers, of Keighley, Yorks, will be acquired as from March 1 by the four largest shareholders in Textile Machinery Makers, Limited, of Oldham. The business will be carried on at Keighley as in the past, under the same general management.

THE PROPOSALS TO INCREASE the capital of Associated Electrical Industries, Limited, to £7,858,000 by the creation of a further 1,363,000 8 per cent. preference shares of £1 each and to offer 10 preference for each 11 of the 7 per cent. preference of British Thomson-Houston Company, Limited, were approved at an extraordinary meeting on February 15. Formal offer has now been made.

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

H. M. Stanley (Scales and Weights), 1a, Oldridge Road, London, S.W.12—£1,500. H. M. and C. C. Stanley.

B. B. Kent, 84, Chancery Lane, London, W.C.2—Vitreous enamellers, metal workers, etc. £10,000. B. B. and D. B. Kent.

W. Coupe & Company, 8, King John's Chambers, Bridlesmith Gate, Nottingham—£500. Engineers, etc. W. Coupe and H. Straw.

Lehmann, Lane & Gibson (Glasgow)—Engineers, founders, smiths, etc. £2,000. H. E. Lane, 38, Castle Avenue, London, E.4, subscriber.

Warren-Roberts & Company, 1-3, Greengate, Salford, Lancs—Ball and roller bearing and gearing engineers, etc. £7,500. C. E. and E. D. Warren-Roberts.